
Contribution ID: **17**

Type: **Oral Presentation**

# Investigate the effect of pore heterogeneity on elastic wave velocity evolution under mineral dissolution process

*Tuesday, 14 May 2024 11:10 (15 minutes)*

Mineral dissolution is a common phenomenon in many subsurface geo-systems, such as carbon sequestration, wastewater disposal and oil and gas recovery. Dissolution can change the topology of porous rock, which affects the rock's geophysical parameters, such as permeability and elastic wave velocity. We numerically investigate the relationships between the evolutions of P-wave and S-wave velocities and permeability induced by mineral dissolution under different pore heterogeneities. We use a linear Boolean model to represent sedimentary rocks with various pore heterogeneities. We reproduce three typical dissolution patterns: compact, uniform and wormhole, by adjusting the Péclet and Damköhler numbers. For these numerical simulations, we use the lattice Boltzmann method to compute the velocity and concentration fields, and the finite element method to compute the strain fields. Our results indicate that the evolution trends of both P-wave and S-wave velocities are similar in all simulations. When the initial pore heterogeneity is fixed, the uniform dissolution pattern cases show a faster decrease of elastic wave velocity as the dissolution progresses; when the dissolution pattern is fixed, the more heterogeneous rock shows a faster decrease of elastic wave velocity. The findings have important implications for subsurface engineering applications involving pore network and fluid path evolutions caused by mineral dissolution.

## Acceptance of the Terms & Conditions

Click here to agree

## Student Awards

## Country

China

## Porous Media & Biology Focused Abstracts

## References

**Primary authors:** ZHANG, Yutian; Mr WU, Yifan (Chengdu University of Technology); Prof. JIANG, Fei (Yamaguchi University); Prof. WANG, Xiaoguang (Chengdu University of Technology); Prof. TSUJI, Takeshi (Tokyo University)

**Presenter:** ZHANG, Yutian

**Session Classification:** MS09

**Track Classification:** (MS09) Pore-scale modelling